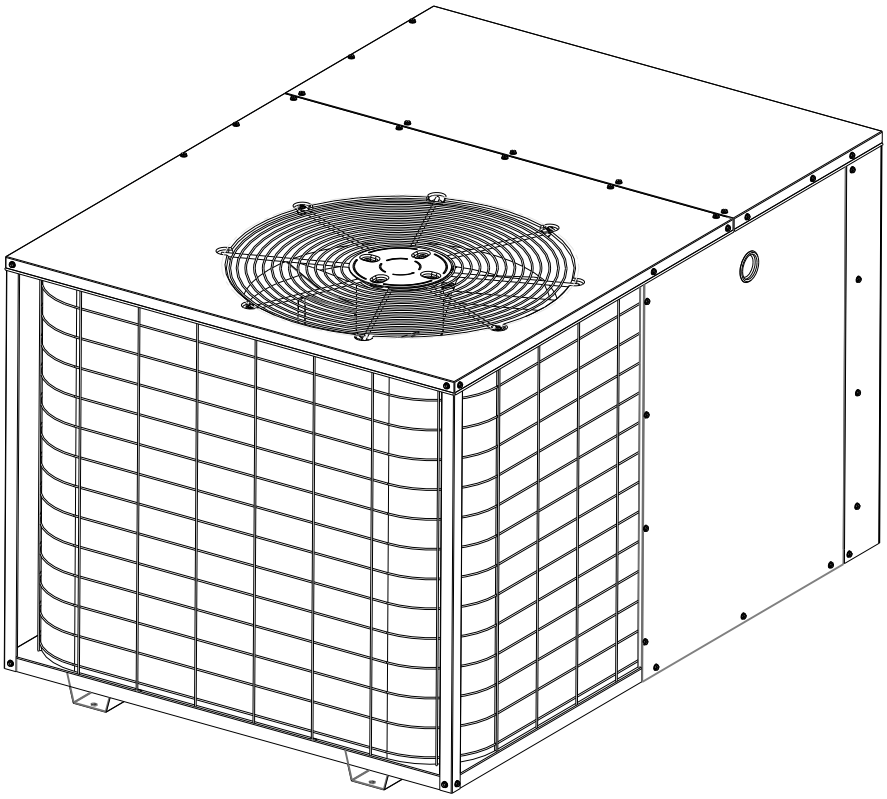
USER's MANUAL & INSTALLATION INSTRUCTIONS

2 Stage R-410A Single Package Heat Pump 15 SEER



IMPORTANT

Please read this information thoroughly and become familiar with the capabilities and use of your appliance before attempting to operate or maintain this unit. Keep this literature where you have easy access to it in the future. If a problem occurs, check the instructions and follow recommendations given. If these suggestions don't eliminate your problem, call your NORDYNE Servicing Contractor (Service PRO).

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation.

DO NOT DESTROY. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

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SAFETY INFORMATION

IMPORTANT: Please read all instructions before servicing this equipment. Pay attention to all safety warnings and any other special notes highlighted in the manual. Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

USER INFORMATION

About the Heat Pump

Your heat pump is a unique, all weather comfort-control appliance that will heat and cool your home year round and provide energy saving comfort. It's an unknown fact that heat is always in the air, even when the outside temperature is below freezing. The heat pump uses this basic law of physics to provide energy saving heat during the winter months. For example, If the outdoor temperature is 47° F (8° C), your heat pump can deliver approximately 3.5 units of heat energy per each unit of electrical energy used, as compared to a maximum of only 1 unit of heat energy produced with conventional heating systems.

In colder temperatures, the heat pump performs like an air conditioner run in reverse. Available heat energy outside the home is absorbed by the refrigerant and exhausted inside the home. This efficient process means you only pay for "moving" the heat from the outdoors to the indoor area. You do not pay to generate the heat, as is the case with more traditional furnace designs.

During summer, the heat pump reverses the flow of the heat-absorbing refrigerant to become an energy-efficient, central air conditioner. Excess heat energy inside the home is absorbed by the refrigerant and exhausted outside the home.

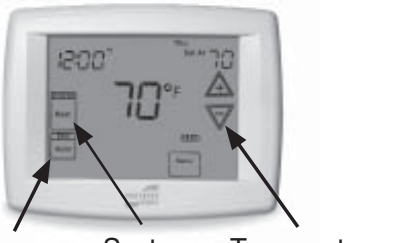

Figure 1. Digital Thermostat

Operating Instructions

Cooling Operation

1. Set the thermostat's system mode to COOL or AUTO and change the fan mode to AUTO. See Figure 1
2. Set the temperature selector to the desired temperature level. The outdoor fan, compressor, and blower motor will all cycle on and off to maintain the indoor temperature at the desired cooling level.

NOTE: If the temperature level is re-adjusted, or the system mode is reset, the fan and compressor in the outdoor unit may not start immediately. A protective timer circuit holds the compressor and the outdoor fan off for approximately three minutes following a previous operation or the interruption of the main electrical power.

Heating Operation

1. Set the thermostat's system mode to HEAT or AUTO and change the fan mode to AUTO. See Figure 1.
2. Set the temperature selector to the desired temperature level. The compressor, outdoor fan, and blower motor will cycle on and off to maintain the indoor temperature at the desired heating level.

NOTE: If the temperature level is re-adjusted, or the system mode is reset, the fan and compressor in the outdoor unit may not start immediately. A protective timer circuit holds the compressor and the outdoor fan off for approximately three minutes following a previous operation or the interruption of the main electrical power.

Emergency Heat

Some thermostats may include a system mode called EM HT or AUX HT, etc. This is a back-up heating mode that should only be used if a problem is suspected. With the mode set to EM HT, etc., the compressor and outdoor fan will be locked off and supplemental heat (electric resistance heating) will be used as a source of heat. Sustained use of electric resistance heat in place of the heat pump will result in an increase in electric utility costs.

Defrost

During cold weather heating operation, the outdoor unit will develop a coating of snow and ice on the heat transfer coil. This is normal and the unit will defrost itself. This unit features Adaptive Demand Defrost that monitors ambient and coil temperatures to regulate the defrost function accordingly.

At the beginning of the defrost cycle, both the outdoor condenser fan and compressor will turn off. After approximately 30 seconds, the compressor will turn on and begin to heat the outdoor coil causing the ice and snow to melt. **NOTE:** While the ice and snow is melting, some steam may rise from the outdoor unit as the warm coil causes the melting frost to evaporate. When defrost is completed, the outdoor fan motor will start, and the compressor will turn off again. In approximately 30 seconds the compressor will start up again and continue normal operation.

System Shutdown

Change the thermostat's system mode to OFF and the fan mode to AUTO (See Figure 1). **NOTE:** The system will not operate, regardless of the temperature selector setting.

Warranty Information

A warranty certificate with full details is included with the heat pump. Carefully review these responsibilities with your dealer or service company. The manufacturer will not be responsible for any costs found necessary to correct problems due to improper setup, improper installation, adjustments, improper operating procedure on the part of the user, etc. Some specific examples of service calls which are not included in the limited warranty are:

1. Correcting wiring problems in the electrical circuit supplying the heat pump.
2. Resetting circuit breakers or other switches.
3. Adjusting or calibrating of thermostat.

INSTALLER INFORMATION

General Information

The installer should comply with all local codes and regulations which govern the installation of this type of equipment. Local codes and regulations take precedence over any recommendations contained in these instructions. Consult local building codes and the National Electrical Code (ANSI CI) for special installation requirements. **Read the following instructions completely before performing the installation.**

Some states require installation and service personnel to be licensed. **Unqualified individuals should not attempt to interpret these instructions or install this equipment.**

This equipment contains R-410A refrigerant under high pressure. Installation or servicing should only be performed by qualified trained personnel thoroughly familiar with this type equipment and related system components.

⚠ CAUTION:

This unit uses refrigerant R-410A. DO NOT under any circumstances use any other refrigerant in this unit. Use of another refrigerant will damage the unit.

Single packaged heat pumps are ready for easy and immediate installation and can be readily connected into the high static duct system of a home. This unit is completely assembled, wired, and run tested at the factory. **This heat pump is designed for outdoor installation only.** The only connections needed for installation are the supply and return ducts, the line voltage, and thermostat wiring. A complete heat pump system typically consists of:

- Single Package Heat Pump
- Home Fittings Kit
- Unit Fittings Kit
- 2-Stage Cooling/Heating Thermostat

Use of components other than those specified may invalidate ARI Certification, Code Agency Listing, and limited warranty on the air conditioner.

Pre-Installation Check

Before you install this unit, the cooling load of the area to be conditioned must be calculated and a system of the proper capacity selected. It is recommended that the area to be conditioned be completely insulated and vapor sealed.

The electrical supply should be checked to determine if adequate power is available. If there is any question concerning the power supply, contact the local power company.

⚠ CAUTION:

To prevent personal injury and/or equipment damage, check thermostat manufacturer's operation of fan relay circuit when in EMER HEAT. When the thermostat system mode is in the EMER HEAT position, the thermostat must energize the fan relay when the fan mode is in the AUTO position.

Inspecting Equipment:

All units are securely packed at the time of shipment and, upon arrival, should be carefully inspected for damage. Claims for damage (apparent or concealed) should be filed immediately with the carrier.

HEAT PUMP INSTALLATION

Locating the Heat pump

- Select a solid, level position, preferably on a concrete slab, slightly above the grade level, and parallel to the home. **DO NOT PLACE UNIT UNDER THE HOME.**
- The hot condenser air must be discharged up and away from the home, and if possible, in a direction with the prevailing wind.
- Do not place the unit in a confined space.
- If practical, place the heat pump and its ducts in an area where they will be shaded from the afternoon sun, when the heat load is greatest.
- If possible, select a site for the unit that is as close as possible to the proposed return grille location.
- The length of the supply and return ducts should be kept to a minimum with no sharp radius bends.

Unpacking the Unit

It is recommended that the unit be unpacked at the installation site to minimize damage due to handling.

⚠ CAUTION:

Do not tip the unit on its side. Oil may enter the compressor cylinders and cause starting trouble. If unit has been set on its side, restore to upright position and do not run for several hours. Then run unit for a few seconds. Do this three or four times with five minutes between runs.

1. Remove the bands from around the unit.
2. Unfold the top and bottom cap flanges.
3. Carefully remove the top cap and tube.

Minimum Clearances

Minimum clearances MUST be maintained from adjacent structures to provide room for proper servicing and air circulation. See Figure 2. DO NOT install unit in a confined or recessed area that will allow discharge air from the unit to re-circulate into the condenser air inlet, through the coil.

Service Access Clearance:

Blower access panel side ..... 24”
Electrical compartment access panel side … 12”
Clearance between overhang and top of unit ..... 72”
Clearance around condenser coil area to wall or shrubs (excludes duct panel side) .. 12”

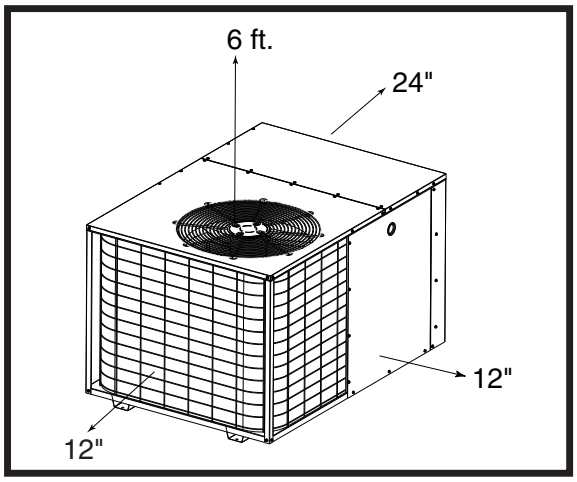

Figure 2. Minimum Unit Clearances

Clearances to Combustible Materials:

Combustible Base (Wood or Class A, B, or C roof Covering material) ..... 0”
Supply and Return Air Ducts..... 0”
Duct Connection side..... 0”

Duct Requirements

The supply duct system, including the number and type of registers, will have much more effect on the performance of an air conditioning system then any other factor. The duct must be sufficiently large to conduct an adequate amount of air to each register.

CONDENSATE DRAINAGE

A 3/4” condensate fitting extends out of the side of the unit (Figure 3). The drain trap, shipped in the electrical compartment, must be installed to prevent water from collecting inside the unit.

1. Thread the elbow provided with the unit into the drain connection until hand tight.
2. Connect the condensate tubing onto the fitting, forming a trap near the drain connection.
3. Route the condensate tube from the trap to a suitable drain. **NOTE:** For proper drainage, make sure the trap is level to the ground and tubing outlet is below trap level.

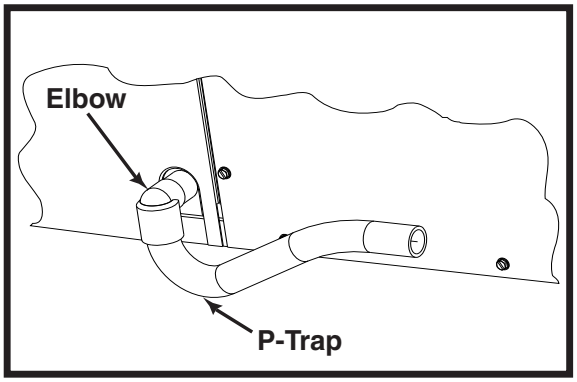

Figure 3. Drain Trap

INSTALLING RETURN AND SUPPLY AIR FITTINGS

The supply and return fittings are included with the unit and located in the supply duct. They attach to the unit openings (Figure 4) with a flange and bead arrangement and may be, secured with two sheet metal screws. **Note:** For easier access, install fittings before positioning unit in final location.

Supply Duct

1. Position the supply duct collar so the edge of the unit opening fits between the flange and the bead.
2. Overlap the collar ends keeping the small screw holes underneath.
3. Align the holes in the crimped area and install one screw. **Note:** It may be necessary to loosen the four screws that hold the transition duct in order to install the supply fitting. Re-tighten when installation is complete.
4. Tap collar (if necessary) to ensure engagement with unit opening and install second screw.
5. Tighten first screw and rotate collar clockwise so joint is near three o'clock position.

Return Duct

1. Align the slots with the holes in the collar and install two screws.
2. Position the collar over the opening and align the four notches in the collar with the four dimples in the panel.
3. Using self-drilling screws (10-16x.5) attach the collar to the rear panel.

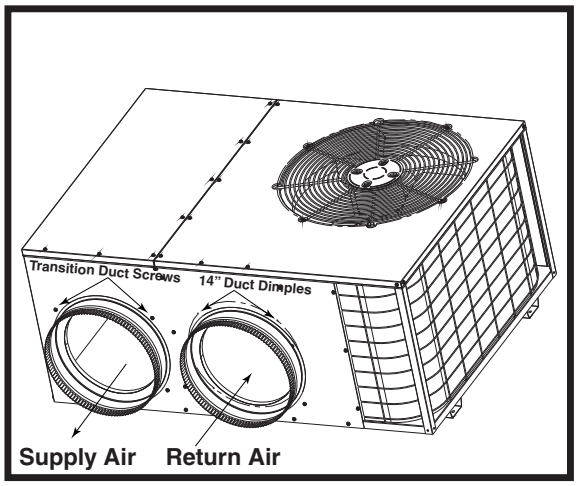

Figure 4. Return and Supply Air Fittings

LOCATING AND INSTALLING THE RETURN AIR ASSEMBLY

To simplify installation, locate and install the return air assembly first. If desired, the return opening can be located inside a closet with louvered doors that has an open area equal to or greater than the 12" x 20" grille furnished. The return air grille can be placed in the wall of a closet and the air ducted into the filter box through a boxed-in area at the closet floor level. **Make sure the filter is readily accessible.**

NOTE: The return air box with grille and filter (Figure 5) should not be located in heavy traffic areas like hallways or center of rooms. A good spot is in a corner or under a table, if a minimum two inch clearance is available.

1. Start the installation from under the home by cutting a small hole in the subfloor. Determine how the floor joist location will affect cutting the opening needed for the return air box. **NOTE:** Floor joists are generally located on 16" centers, leaving 14-3/8" between joists.
2. After measuring the return air box (approximately 12-1/4" x 20-1/4"), cut the hole through the floor so that the box will fit between the floor joists. Care should be taken when cutting through carpeting to avoid snags. **NOTE:** In most installations it will be necessary to cut a similar hole in the fiberboard directly under the hole in the floor. However, if the floor is more than ten inches deep, it will only be necessary to cut a hole for the collar on the return air box or for the insulated duct.
3. Set the box into the opening and fasten with screws or nails.
4. Put the filter and return air grille in place.

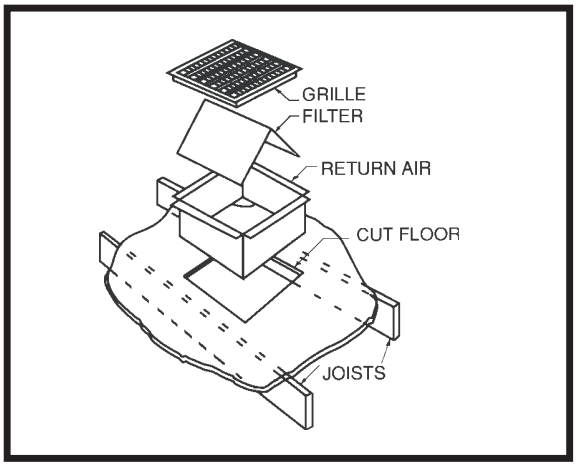

Figure 5. Return Air Box

LOCATING AND INSTALLING THE SUPPLY DAMPER(S)

When locating the supply damper(s), carefully check floor joists and frame members that could interfere with the installation of the damper or flexible duct. Ideally, the damper (Figure 6) should be located in the bottom of the main duct, forward of center of the home, at least three feet from the nearest register. The round supply opening in the slanted side of the damper should face the side of the home where the heat pump is located.

1. Locate the center of the heat duct by cutting a small hole in the fiberboard below the duct at the desired location.
2. Cut a hole approximately 3/4" larger than the damper opening in the fiberboard.
3. Cut a 9-1/8" x 13-1/8" hole in the duct and bend over all tabs flat on the inside of the heat duct.
4. Insert the damper into the duct and bend over all tabs flat on the inside of the heat duct.
5. Seal the opening between the fiberboard and damper or flexible duct.

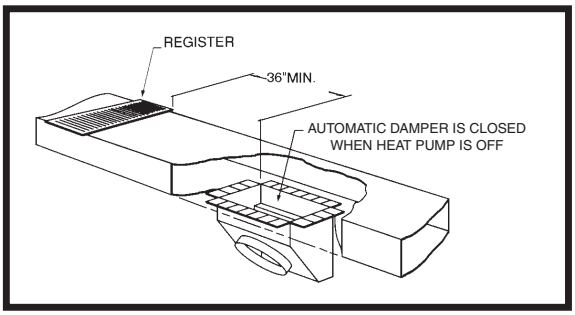

Figure 6. Supply Damper

DUCTING SYSTEM

Air ducts should be installed in accordance with the standards of the National Fire Protection Association "Standard for Installation of Air Conditioning and Ventilation Systems" (NFPA 90A), "Standard for Installation of Residence Type Warm Air Heating and Air Conditioning Systems" (NFPA 90B), these instructions, and all applicable codes.

The supply duct system, including the number and type of registers, will have much more effect on the performance of the system than any other factor. The duct must be sufficiently large to conduct an adequate amount of air to each register. See Table 1 or Figure 7.

The heat pump system will not cool or heat the home if air is lost to the outside through leaks in the duct system. Ducts that are collapsed or restricted by foreign objects will also prevent adequate air flow.

Item No.	Description
1	12" x 20" Return Air
2	16" x 20" Air Filter
3	12" x 20" Grille
4	Supply Damper
5	14" Diameter Flex Return Duct
6	12" Diameter Flex Supply Duct
7	12" x 12" x 12" "Y" Fitting

Table 1. Typical Applications

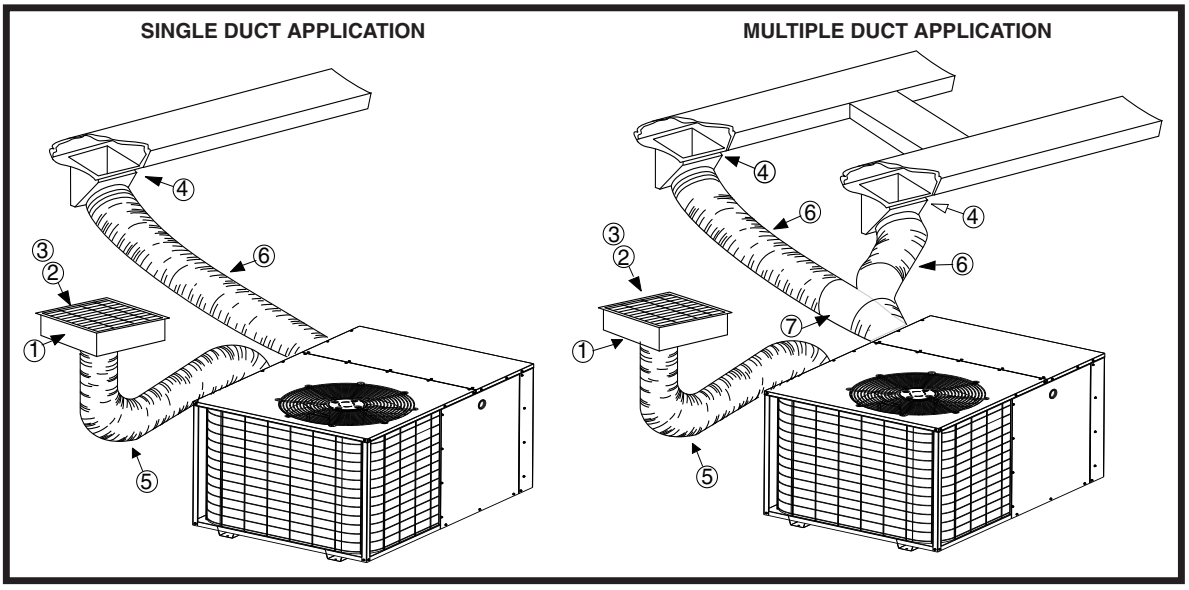

Figure 7. Single and Multiple Duct Applications

Note: For highly resistive duct systems it may be necessary to add an additional return air duct and or supply to achieve maximum performance and prevent coil icing and refrigerant flood back.

Connecting the Return and Supply Air Flexible Ducts

- The return duct for all units is 14" diameter.
- The supply duct for all units is 12" diameter.
- The flexible ducts can be connected to the corresponding fittings with the clamps provided with the ducts. **Note:** To prevent a loss in cooling capacity, make sure all connections are tight.
- The flexible ducts may be cut to the required length, see instructions packed with duct. **Keep all ducts as short and straight as possible. Avoid sharp bends.**
- Ducts may be spliced with sheet metal sleeves and clamps.
- Once the inner duct is connected to the proper fitting, the insulation and plastic sleeve should be pulled over the connection and clamped.
- Homes with multiple supply ducts (or special applications), a Y fitting is available to divide the supply air so it can be ducted to different areas of the home for more efficient cooling. **Note:** For maximum performance, insulate the Y fitting.

Blower Speed

For optimum system performance and comfort, it may be necessary to change the factory speed setting. See Table 2 (page 10) for factory settings. **NOTE**: Q5RE models have High Efficiency Motors with 5 speed taps.

⚠ WARNING:

To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.

1. Disconnect all electrical power to the unit and remove the service panel.

⚠ CAUTION:

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

2. Locate the orange, black and red wires terminated to the blower motor. The orange wire controls the low speed cooling and heating operations, the black wire controls high speed cooling and heating operations and the red wire controls the electric heating operation.

⚠ CAUTION:

To avoid personal injury or property damage, make certain that the motor leads cannot come into contact with any metal components of the unit.

3. Verify the required speed from the airflow data found in Table 2. Place appropriate wire on the appropriate motor speed tap for the required airflow.
4. Check all factory wiring per the unit wiring diagram and inspect the factory wiring connections to be sure none loosened during shipping or installation.

ELECTRICAL CONNECTIONS

⚠ WARNING:

To avoid electric shock, personal injury, or death, turn off the electric power at the disconnect or the main service panel before making any electrical connections.

High Voltage

1. Install a branch circuit disconnect of adequate size as specified by the National Electrical Code. **Locate the disconnect within sight of the unit.**
2. Extend leads through power wiring hole (Figure 9). Connect **L1** and **L2** directly to the contactor.
3. Ground the heat pump unit using the green grounding screw provided in the control panel.

Low Voltage

1. Route 24V control wires through the sealing grommet (Figure 8) near the power entrance.
2. Connect the control wires to the defrost board and blower relay wire (Figure 9, page 10).

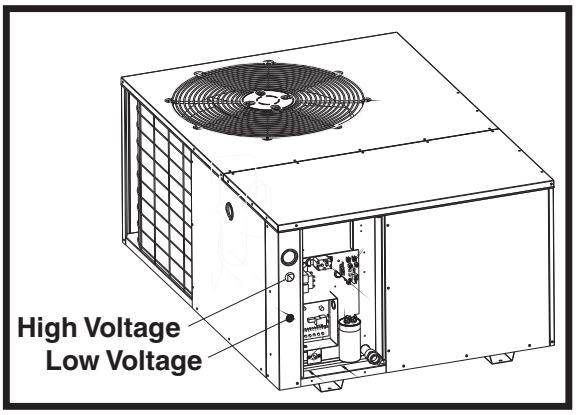

Figure 8. Power Entry

Overcurrent Protection
Generally, the best fuse or breaker for any heat pump is the smallest size that will permit the equipment to run under normal usage and provide maximum equipment protection. Properly sized fuses and breakers also prevent nuisance trips during unit startup. **If a fuse blows or a breaker trips, always determine the reason. Do not arbitrarily install a larger fuse or breaker and do not, in any case, exceed the maximum size listed on the data label of the unit.**

Locating the Thermostat
Locate the thermostat away from drafts and slamming doors. The thermostat must not be installed on an outside wall or any other location where its operation may be adversely affected by radiant heat from fireplaces, sunlight, or lighting fixtures, or convective heat sources such as supply air registers or electrical appliances. Mount on an inside wall approximately five feet from the floor.

This heat pump is a two stage Cooling and Heating appliance that requires a 2-stage Cooling/Heating thermostat. The heat-cool thermostat prevents simultaneous operation of the heating and cooling units and is equipped with an ON-AUTO fan mode that allows the home owner to operate the indoor blower when only air circulation is desired.

Connect the low voltage wires to the respective terminals on the thermostat base (Figure 9). See thermostat instruction sheet for more detailed information.

2-Speed Outdoor Fan Motor (Select Models)
If the unit utilizes a 2-speed condenser fan motor, this motor will operate on low speed when in low cooling/heating, and on high speed when in high cooling/heating.

Low Pressure Switch
The low pressure switch is factory installed and located in the suction line internal to the unit. The switch is designed to protect the compressor if a loss of charge occurs. Under normal conditions, the switch is closed.

If the suction pressure falls below 5 psig, then the switch will open and de-energize the unit. The switch will close again once the suction pressure increases above 20 psig. The low pressure switch interrupts the thermostat inputs to the unit. **Note:** When the switch opens and then closes, there will be a 3 minute short cycling delay before the unit can energize.

High Pressure Switch
The high pressure switch is factory installed and located in the compressor discharge line internal to the unit. The switch is designed to de-energize the system when very high pressures occur during abnormal conditions. Under normal conditions, the switch is closed.

If the discharge pressure rises above 575 psig, the switch will open and de-energize the unit. The switch will close again once the discharge pressure decreases to 460 psig. The high pressure switch interrupts the thermostat inputs to the unit. **Note:** When the switch opens and then closes, there will be a 3 minute short cycling delay before the unit can energize.

Defrost Cycle Control
The defrost cycle is controlled by an adaptive demand defrost board which features:

- Adaptive Demand Defrost algorithm.
- 4 Field selectable defrost termination temperatures.
- Field selectable delay feature.
- High pressure and low pressure switches.
- Sensing of second stage compressor demand.
- Test/speed up capability.
- Anti short cycle timer (3 minutes) for compressor protection.
- On board diagnostics with flashing LED for quicker troubleshooting. See Table 3 (page 11).

The adaptive Demand Defrost controls the defrost cycle in response to an adaptive demand algorithm that uses coil temperature and ambient temperature. It provides user selectable defrost termination temperatures (50° F - 80° F coil temperature).

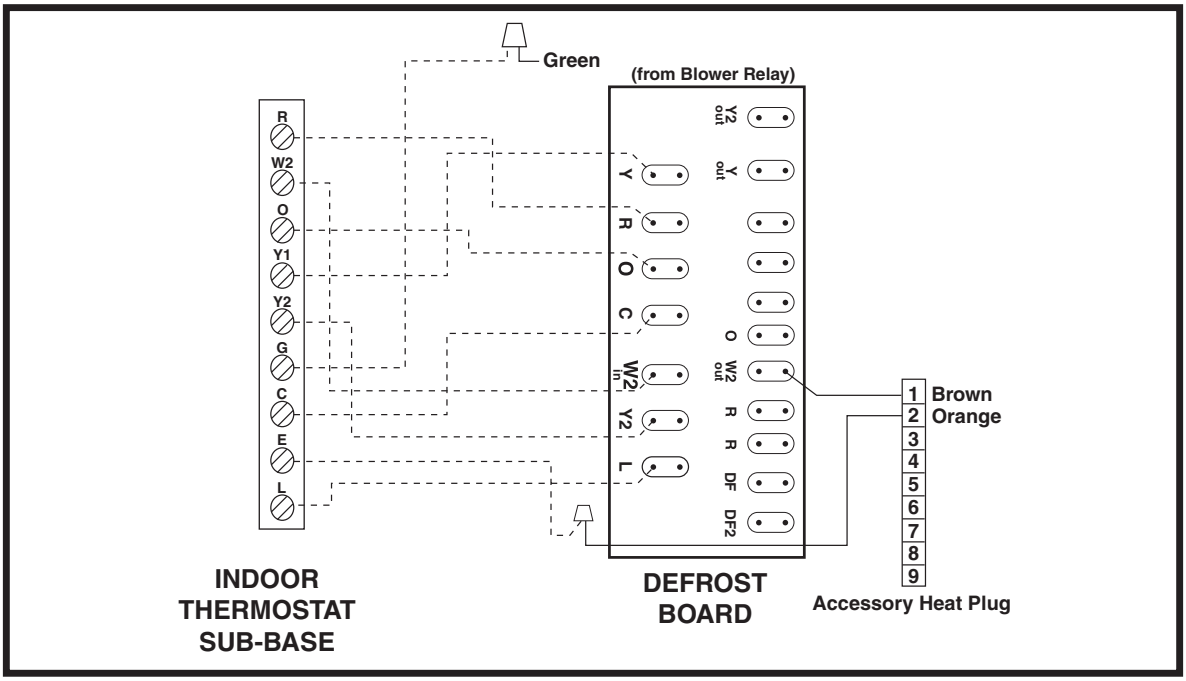

Figure 9. Typical Wiring (Field Supplied) for 2-Stage Cool, 2 Stage Electric Heat

Model Q5RF	Wire Color/Speed Tap	Motor Speed	Air Flow (@ 0.3 in WC)
X24K	T1	Low	560
	Orange/T2	Medium/Low *	600
	Black/T3	Medium **	800
	Red/T4	Medium/High ***	1,040
	T5	High	1,250
X36K	Orange/T1	Low *	600
	T2	Medium/Low	750
	Black/T3	Medium **	1,200
	Red/T4	Medium/High ***	1,420
	T5	High	1,520
X48K	Orange/T1	Low *	1,030
	T2	Medium/Low	1,240
	Red/T3	Medium ***	1,400
	Black/T4	Medium/High **	1,530
	T5	High	1,680
X60K	Orange/T1	Low	1,060
	T2	Medium/Low*	1,200
	Red/T3	Medium ***	1,500
	Black/T4	Medium/High **	1,760
	T5	High	1,970

* Denotes Factory Set Low Speed Cooling/ Heating
** Denotes Factory Set High Speed Cooling/ Heating
*** Denotes Factory Set Electric Heating Speed

Table 2. Motor Lead Connection

Control is uncalibrated when power is applied. Calibration occurs after a defrost cycle. The control initiates defrost after 34 minutes of accumulated compressor run time in heating with coil temperature below 35° F. The defrost cycle terminates when the coil sensor reaches termination temperature or after 14 minutes. **Note:** All units are shipped from the factory with the default termination temperature set at 70° F.

Defrost function is disabled if coil temperature is above 35° F. If the ambient sensor is detected as open or shorted, demand defrost will not operate and control will revert to time/temperature defrost operation. If the outdoor coil sensor is detected as open or shorted, the control will not perform demand or time/temperature defrost operation. **Note:** When the defrost cycle initiates, there will be a 30 second compressor delay going into and out of the defrost cycle. This delay may be removed by removing P6 connector on the board.

This 2-stage unit will defrost in second stage regardless of the stage called for by the thermostat.

Diagnostic Description	LED Status
Control Fault (No Power)	Off
Normal Operation	On
ASCD Delay Active (with compressor demand)	1 Flash
Low Pressure Switch Lockout	2 Flashes
High Pressure Switch Lockout	3 Flashes
Ambient Sensor Fault	4 Flashes
Coil Sensor Fault	5 Flashes

Table 3. Control Diagnostic

Ambient Sensor Mounting

For optimum performance of the heat pump system, the ambient sensor (Figure 10) must be mounted on the outside of the unit.

1. Remove the mounting bracket and all hardware included in the packet.
2. Remove star bushing from 7/8" hole in corner panel of the unit.
3. Route the ambient sensor through the 7/8" hole in the corner panel of the unit, and then through the 7/8" hole in the mounting bracket.
4. Route the sensor through the star bushing. Use the star bushing to secure the mounting bracket to the unit.
5. Secure the ambient sensor inside the plastic clip and secure it to the mounting bracket with the screw and nut provided.
6. Install one spacer next between the plastic clip and mounting bracket.
7. Bend the mounting bracket into position. Install the mounting bracket to the unit using the screw in the corner panel.

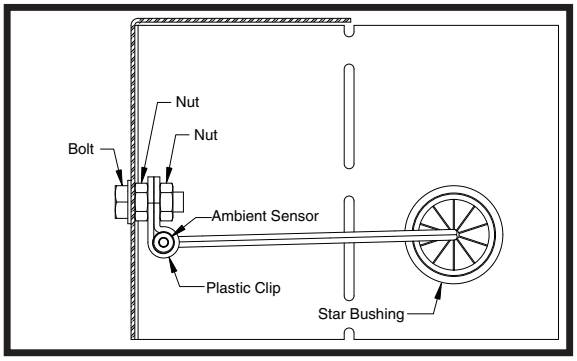

Figure 10. Ambient Sensor Mounting

Electric Heat Package (optional)

This heat pump is shipped without an auxiliary electric heat kit installed. If electric heat is desired, an accessory Heater Kit must be field installed. See Specifications Sheet for available kits and their application.

- Select the correct size heat package for the installation.
- Follow installation instructions provided with each heater kit.
- Installation is most easily accomplished before making duct or electrical connections.
- Refer to Table 2 (page 10) for blower speeds.

SYSTEM OPERATION

Pre-Start Checklist

The following check list should be observed prior to starting the unit.

√ Is the unit level? Unit should be level or slightly slanted toward the drain for proper condensate drainage.

√ Is the unit installed with the proper clearances as listed in Figure 2 (page 5)?

√ Is the wiring correct according to the wiring diagram and electrical codes?

√ Are all the wiring connections tight? Check the condenser fan to make sure it turns freely.

√ Is the overcurrent protection properly sized?

√ Is the thermostat wired correctly? Is it installed in a proper location?

Start-Up Procedure

The control circuit consists of an anti-short cycle timer that will not let the compressor re-start before three (3) minutes have elapsed.

Set the thermostat system mode to OFF, and the thermostat fan mode to AUTO. Apply power at the disconnect switch and check the system operations:

Air Circulation

Leave the thermostat system mode on OFF, and set the fan mode to ON. Blower should run continuously. Check the air delivery at the supply registers and adjust register openings for balanced air distribution. Examine ductwork for leaks or obstruction if insufficient air is detected.

Set the thermostat fan mode to AUTO. The blower should stop running.

System Heating

Set the thermostat system mode to HEAT and the fan mode to AUTO. Change the thermostat temperature selector above the existing room temperature and check for the discharge of warm air at the supply registers.

System Cooling

Set the thermostat's system mode to COOL and the fan mode to AUTO. Change the thermostat temperature selector below the existing room temperature. Allow the cooling system to operate for several minutes and check for the discharge of cool air at the supply registers.

Short Cycle Protection

The control circuit is equipped with a time-delay feature for protection against short cycling. With the system operating in the cooling mode, gradually raise the thermostat temperature setting until the whole system de-energizes. Immediately lower the thermostat temperature to the original setting and verify that the indoor blower is energized. After approximately 3 minutes the compressor and the outdoor fan will energize.

Emergency Heat

(Available only when Electric heat is supplied) Set the thermostat's system mode to EM HT and the fan mode to either AUTO (intermittent air) or to ON (continuous air). Change the thermostat's temperature selector above the existing room temperature and check the following:

1. The thermostat auxiliary heat light (RED) should be on.
2. The heat pump compressor and the fan should not run; low voltage circuit remains energized.
3. The blower will run according to the thermostat's fan mode setting.

Defrost Test Procedure

1. Terminals **R** & **C** must have 18 - 30V between them for defrost sequences to initiate.
2 With thermostat in heat mode (**Y** connected to **R**), short (and hold) the "TEST" pins together. **NOTE:** This energizes the reversing valve to initiate a forced defrost, bypass the ASCD, and allow the high stage compressor to turn on immediately (if the "REMOVE FOR NO DELAY" jumper at P6 is removed). If the "REMOVE FOR NO DELAY" jumper at P6 is installed, the compressor will energize after a 30 second delay.
3. Remove the short on the "TEST" pins.

- If the Coil temperature is above the Terminate Temperature setting, the defrost cycle will terminate (reversing valve de-energizes).
- If the coil temperature is below the Terminate Temperature setting, the defrost cycle will continue for 14 minutes (or until the coil temperature rises above the Terminate Temperature setting). Short the "TEST" pins for 1 second or more to force the control out of defrost and back to heating mode (reversing valve de-energized). Compressor will start immediately (if the "REMOVE FOR NO DELAY" jumper is removed). **NOTE:** If the "REMOVE FOR NO DELAY" jumper is installed, the compressor will energize after a 30 second delay.

Note: If the **Y2** thermostat input is energized (on a 2-stage system), the second stage turns on. If the above steps will not initiate a defrost, replace the defrost board.

Anti Short Cycle Timer Test

The 3 minute time delay feature can be bypassed by shorting the "TEST" pins together.

Heating Mode

When the "TEST" pins are shorted together for more than 1 second, the control will switch between defrost mode and heating mode as described in the Defrost Test Procedure section (page 12).

Cooling Mode

When the 'TEST" pins are shorted together for more than 1 second, the Anti Short Cycle Timer will be bypassed.

ADJUSTMENT OF REFRIGERANT CHARGE:

⚠ CAUTION:

This heat pump contains liquid and gaseous refrigerant under pressure. Adjustment of refrigerant charge should only be attempted by qualified, trained personnel thoroughly familiar with the equipment and safe responsible refrigerant handling procedures. Under no circumstances should the homeowner attempt to install and/or service this equipment. Failure to comply with this warning could result in equipment damage, personal injury, or death.

NOTE: The unit must be charged while both first and second stages are operating.

NOTE: To achieve rated capacity and efficiency the compressor must be exposed to refrigerant for at least 24 hours prior to running and then must be run for a minimum of 12 hours. See Refrigerant Charging Charts (Figures 11 - 14, pages 14 & 15) for Charging in Cooling Mode.

Charging an R-410A Unit in AC Mode with Outdoor Temperatures Above 65F.

1. With the system operating at steady-state, measure the liquid refrigerant pressure in psig at the service valve.
2. Measure the liquid refrigerant temperature (° F) at the service valve.
3. For the temperature measured, determine the required liquid refrigerant pressure from the appropriate charging chart (Table 4).

- If the pressure measured in step 1 is greater than the required liquid refrigerant pressure determined in step 4, then there is too much charge in the system. Remove refrigerant and repeat steps 1 through 3 until the system is correctly charged.
- If the pressure measured in step 1 is less than the required liquid refrigerant pressure determined in step 4, then there is too little charge in the system. Add refrigerant and repeat steps 1 through 3 until the system is correctly charged.

Charging an R-410A Unit in Heating Mode.

1. Evacuate the refrigerant system.
2. Weigh in the proper charge as shown in Table 4 below and use the Heating Charging Tables (pages 16 & 17) as a guide. Tables reflect conditions at high speed operation. Unit charge MUST be verified in cooling season.
3. Verify the unit is operating properly according to the heating functional checkout on page 12.

Tonnage	System Charge R-410A oz.
2 Ton	140
3 Ton	150
4 Ton	197
5 Ton	256

Table 4. Heat Pump Charge

Refrigerant Charging Charts for Cooling Mode of Operation

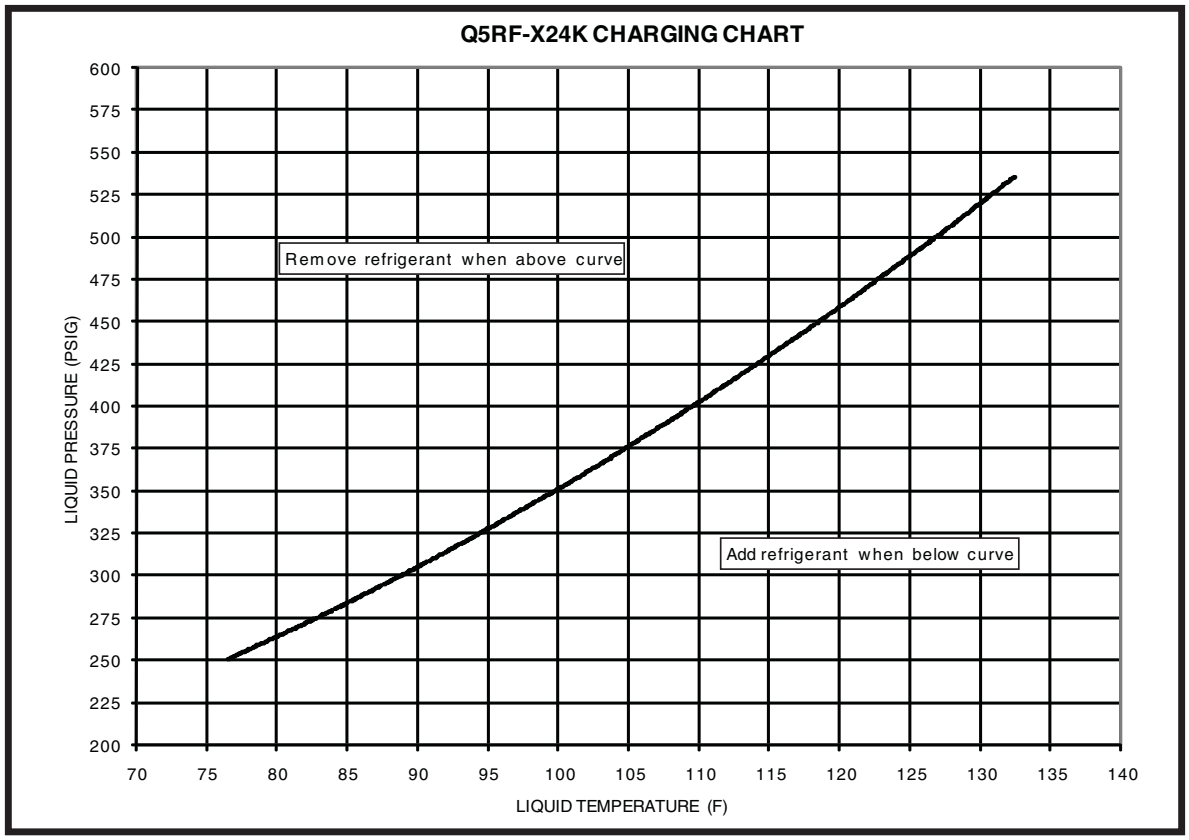

Figure 11. Charging Chart for 2 ton Units

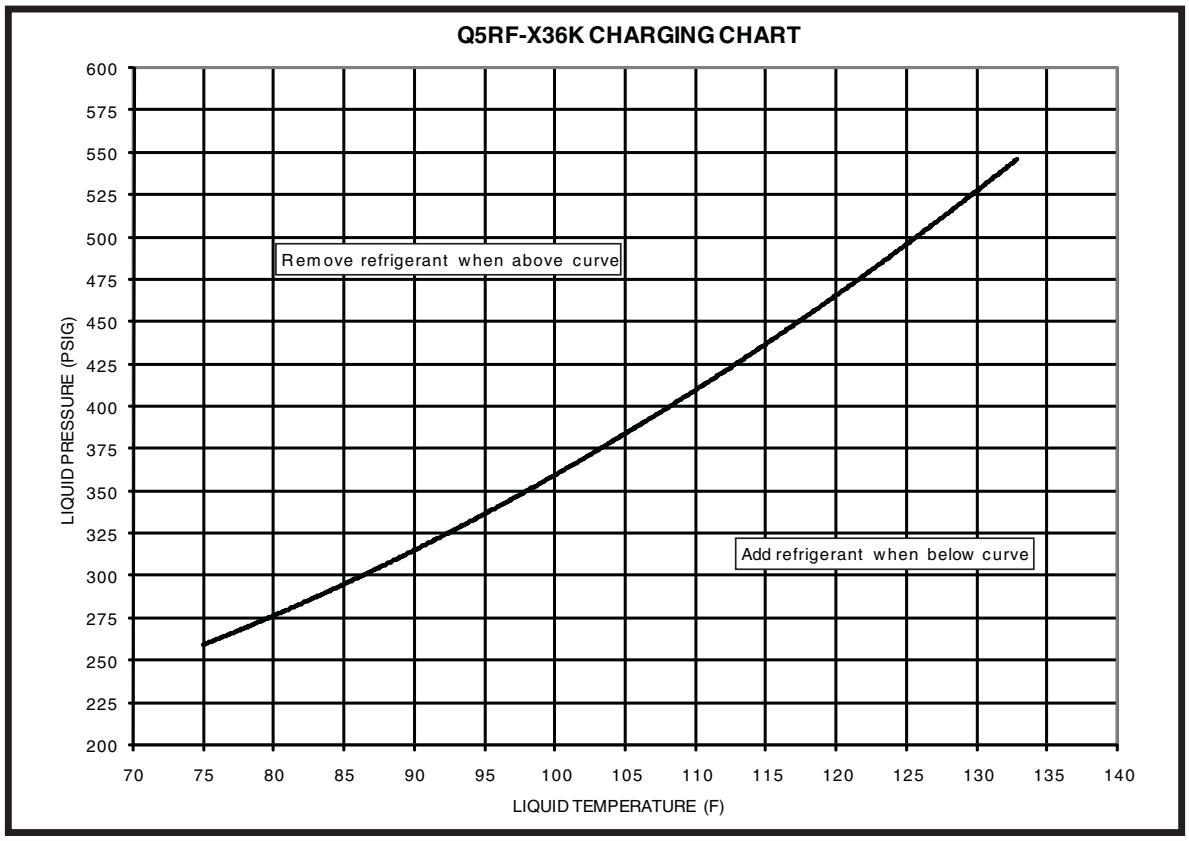

Figure 12. Charging Chart for 3 ton Units

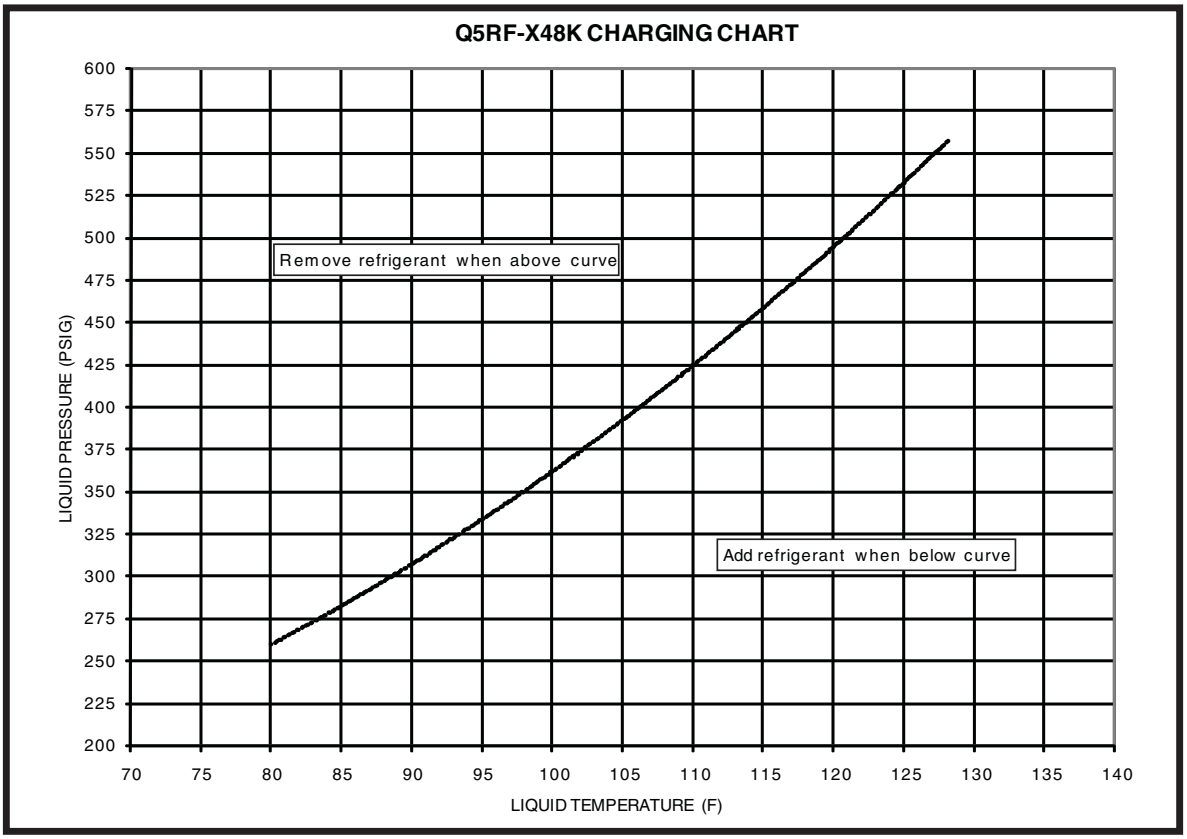

Figure 13. Charging Chart for 4 ton Units

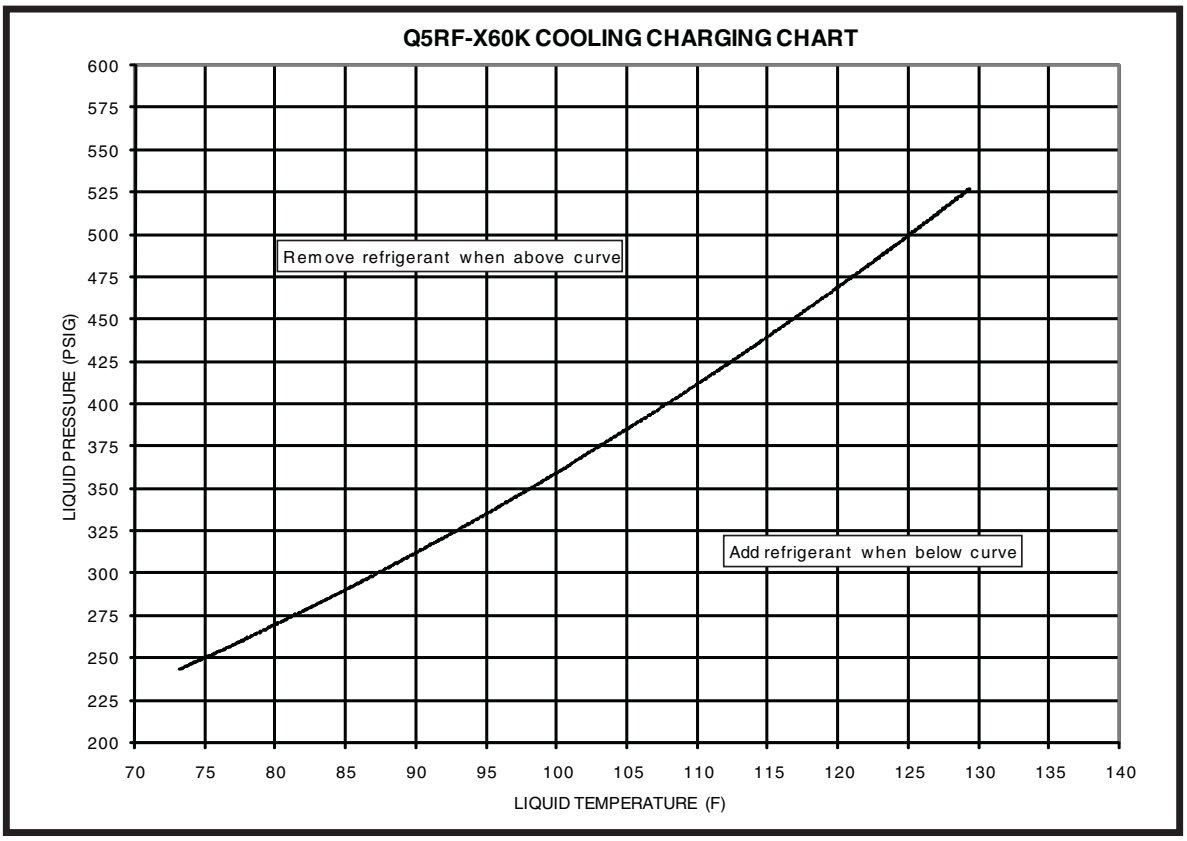

Figure 14. Charging Chart for 5 ton Units

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Refrigerant Charging Tables for Heating Mode of Operation

Refrigerant Charging Chart Legend for Heating Mode of Operation:

Shaded boxes indicate flooded conditions.

Rated design values. The suction pressure will vary from design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures vary.

1. All pressures are listed psig and all temperatures in °F
2. Discharge temperatures greater than charted values indicate an undercharged system.

Q5RF-X24K

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.
37	205	126	52	226	128	67	247	131	82	268	133	97	283	145	112	314	167	127	345	189
38	212	124	53	232	126	68	252	129	83	272	131	98	290	142	113	321	163	128	352	183
39	219	122	54	238	124	69	257	127	84	275	129	99	297	139	114	328	158	129	359	177
40	226	120	55	244	122	70	261	125	85	279	127	100	304	137	115	335	154	130	366	171
41	233	118	56	249	120	71	266	123	86	283	125	101	311	134	116	342	149	131	373	165
42	240	116	57	255	118	72	271	121	87	286	123	102	318	131	117	349	145	132	380	158
43	247	114	58	261	116	73	276	119	88	290	121	103	325	128	118	356	140	133	387	152

Q5RF-X36K

OUTDOOR TEMPERATURE (DEG. F)																				
0			10			20			30			40			50			60		
Suc. Press	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.
37	188	102	50	224	114	63	261	127	77	297	139	92	321	159	109	357	186	126	392	213
38	195	100	51	230	112	64	265	125	78	301	137	93	328	156	110	364	181	127	399	207
39	202	98	52	236	110	65	270	123	79	304	135	94	335	153	111	371	177	128	406	201
40	209	96	53	242	108	66	275	121	80	308	133	95	342	150	112	378	172	129	413	195
41	216	94	54	248	106	67	280	119	81	312	131	96	349	147	113	385	168	130	420	188
42	223	92	55	254	104	68	284	117	82	315	129	97	356	144	114	392	163	131	427	182
43	230	90	56	260	102	69	289	115	83	319	127	98	363	142	115	399	159	132	434	176

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Refrigerant Charging Tables for Heating Mode of Operation - (continued)

Refrigerant Charging Chart Legend for Heating Mode of Operation:

Shaded boxes indicate flooded conditions.

Rated design values. The suction pressure will vary from design value if outdoor air flow, entering dry bulb, or entering wet bulb temperatures vary.

1. All pressures are listed psig and all temperatures in °F
2. Discharge temperatures greater than charted values indicate an undercharged system.

Q5RF-X48K

OUTDOOR TEMPERATURE (DEG. F)

0			10			20			30			40			50			60		
Suc. Press	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.
29	263	160	45	268	157	61	272	155	77	276	153	91	286	158	104	323	170	116	361	181
30	270	158	46	273	155	62	277	153	78	280	151	92	293	155	105	330	165	117	368	175
31	277	156	47	279	153	63	282	151	79	284	149	93	300	152	106	337	161	118	375	169
32	284	154	48	285	151	64	286	149	80	287	147	94	307	149	107	344	156	119	382	163
33	291	152	49	291	149	65	291	147	81	291	145	95	314	146	108	351	152	120	389	157
34	298	150	50	297	147	66	296	145	82	295	143	96	321	144	109	358	147	121	396	151
35	305	148	51	303	145	67	301	143	83	298	141	97	328	141	110	365	143	122	403	144

Q5RF-X60KK

OUTDOOR TEMPERATURE (DEG. F)

0			10			20			30			40			50			60		
Suc. Press	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.	Suc. Press.	Liquid Press.	Disch. Temp.
31	205	104	46	229	113	61	253	123	76	277	132	92	304	148	107	358	169	122	412	191
32	212	102	47	235	111	62	258	121	77	280	130	93	311	145	108	365	165	123	419	185
33	219	100	48	241	109	63	262	119	78	284	128	94	318	142	109	372	160	124	426	179
34	226	98	49	247	170	64	267	117	79	288	126	95	325	139	110	379	156	125	433	173
35	233	96	50	253	105	65	272	115	80	291	124	96	332	137	111	386	152	126	440	167
36	240	94	51	258	103	66	277	113	81	295	122	97	339	134	112	393	147	127	447	160
37	247	92	52	264	101	67	282	111	82	299	120	98	346	131	113	400	143	128	454	154

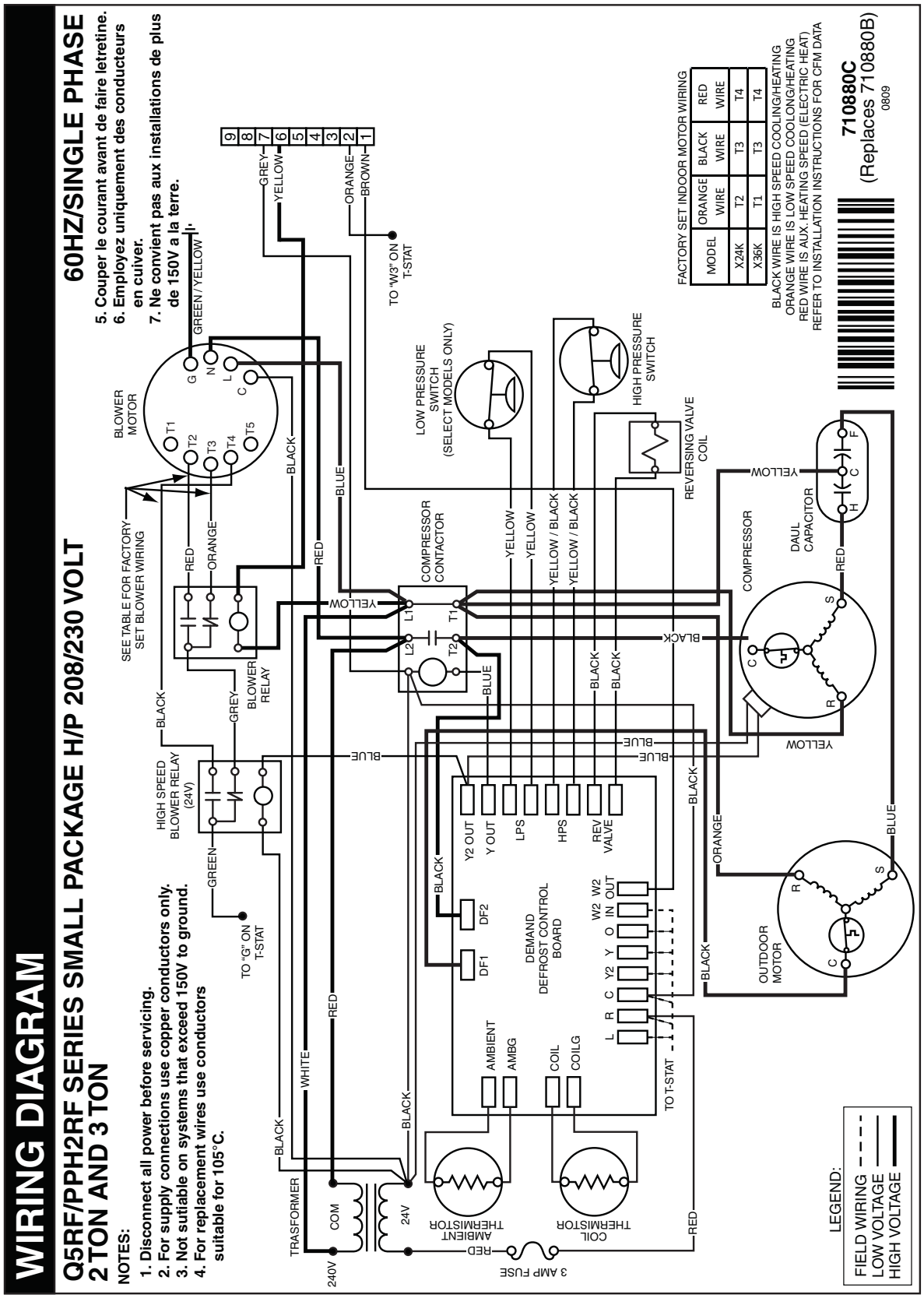

Figure 15. Q5RF/PPH2RF Series Wiring Diagram - 2 & 3 Ton Units

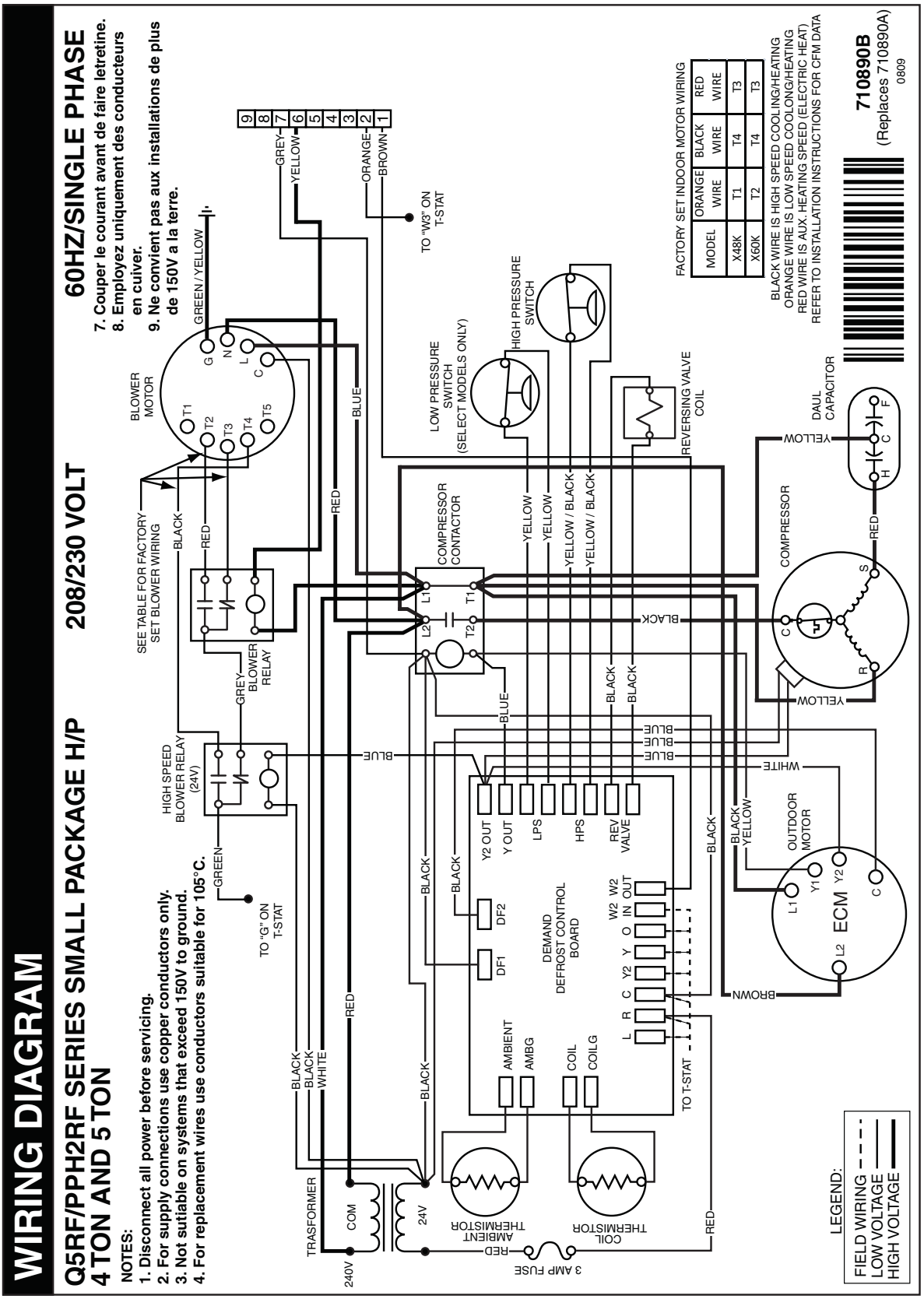

Figure 16. Q5RF/PPH2RF Series Wiring Diagram - 4 & 5 Ton Units

INSTALLER

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